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EDWARD ORTON.

EDWARD ORTON, born Deposit, Delaware county, N. Y., March 9, 1829, was descended from old New England stock on both sides of the house. His father, Thomas Orton, a Presbyterian clergyman, whose memory is still cherished in north-western New York, moved to Ripley, N. Y., on the Lake Erie shore soon after his son's birth. There the son grew up amid an agricultural population, sharing their work and their amusements and gaining an intimate knowledge of their needs which affected his whole course in life. As a lad, he is said to have been somewhat shrinking and sensitive to ridicule; always courteous, always considerate of the feelings of others and sternly conscientious.

His father prepared him for college and, at what appears to us the early age of fifteen, he entered the Sophomore year at Hamilton with the class of 1848. The college course of fifty years ago was narrow, carefully avoiding more than very superficial treatment of the inductive sciences and dwelling chiefly upon classics, elementary mathematics and certain philosophical studies. Edward Orton pursued the course faithfully, though there was little in it attractive to one of his tastes, and at graduation he had a well trained mind with a good stock of such

knowledge as the course afforded. The careful drill in linguistics was that from which he derived most profit, and it was in evidence throughout his writings.

After teaching for one year at Erie, Pa., he entered Lane Theological Seminary at Cincinnati, O., to prepare for the Presbyterian ministry, but, before the year ended, his eyesight failed and he gave up study to become clerk on a coasting vessel sailing to Florida. The autumn of 1851 found him in the Delaware Literary Institute at Franklin, N. Y., where, as instructor in Natural Sciences and German, he was expected to teach any subject offered in the very liberal curriculum. The hours were long and the classes numerous, but his enthusiasm infected the pupils, who accompanied him on long field excursions for study of botany and geology. The next year was spent at Harvard in the study of chemistry and botany, after which another year was spent in successful teaching at Franklin. He then entered Andover Theological Seminary to complete preparation for the ministry. He was licensed in 1855, and soon afterward was ordained to act as pastor of the Presbyterian church at Downs-ville, Delaware county, N. Y.

He resigned his charge in June 1856, to become professor of Natural Sciences in the New York State Normal School at Albany, N. Y. There he had access to the State Museum and was associated intimately with the strong men on its staff. His life in the Normal School was ideal, and his studies in the State Museum were what he had longed for. Everything appeared to be conspiring to his benefit and to great usefulness in his chosen work.

But, early in his theological studies, doubts had arisen in his mind respecting some tenets of the church and these, it is believed, had something to do with the abrupt termination of his studies at Lane seminary. These doubts were made stronger by the surroundings at Harvard and he undertook the study at Andover with an earnest desire to remove them. It contributed to that result at least so far as to render them subordinate and to permit him to assume the Presbyterian ministry. After he

went to Albany, however, the doubts returned and, increasing in intensity, became convictions so strong that he could not consent to remain in connection with his denomination. To avow his opinions, which, being practically those of the Unitarian church, were very unpopular at that time, would involve not only separation from his church affiliations but also loss of his position in the Normal School; for, though that was a state institution, a public discussion of his views might have alienated an influential portion of the community if he had retained his chair. To many men the temptation would have been serious; no longer in the active ministry, he could have concealed his opinions and could have withdrawn from his denomination without discussion, in this way retaining his position, so important as affording not merely support but also opportunity for thorough study. But his sturdy integrity knew nothing of casuistry; he could not be guilty of even negative hypocrisy. He avowed his opinions, gave up his position, lost his income but gained the abiding respect of his associates, both in church and in school.

The only opening immediately available was the principalship of an academy at Chester, Orange county, N. Y., which he accepted and held for six years, fitting young men for college and lecturing on scientific subjects whenever he had opportunity. His duties left little of spare time, but what he had was utilized in study of such natural phenomena as the region presented, especially those connected with agricultural interests—an admirable preparation for his future work.

Professor Orton's intimate friend at Chester was the Rev. Austin Craig, pastor of an independent church near that place. In 1865, Mr. Craig was chosen acting president of Antioch College in Yellow Springs, O., and Professor Orton was made principal of the preparatory department. Soon afterwards he was appointed to the chair of Natural Sciences. He proved himself so wise, so tactful, that, in 1872, he was called to the presidency of the college. But he was reluctant to assume the responsibility and wrote to Dr. Newberry, with whom he was associated on the State Geological Survey, asking advice. In a

manly way, without self-depreciation, he gave his reasons for hesitation. Dr. Newberry's emphatic reply was that a man's friends usually understand him better than he does himself. The position was accepted and the event proved that his friends were right. His administration was marked with such vigor, and at the same time with such good judgment in dealing with men both inside and outside of the college that he soon became known throughout the state. When the State Agricultural College was organized in 1873, he was made president, and professor of geology.

The organization of a state college with the agricultural land grant as the endowment was a task whose magnitude might well appal a thoughtful man. Local colleges dreaded a powerful rival; farmers demanded a curriculum suited to their conception of agriculture; lovers of the old methods of education feared too much of application to everyday matters; "practical" men insisted that little attention should be paid to theory, and that "practice" should be supreme; politicians saw in the new institution an opportunity to strengthen themselves by grants of positions; while not a few thought the gift from the national government might prove to be another Pandora's box. But happily, the first board of trustees proved to be men of excellent common sense; they recognized that the work of organization, if it were to be done well, would have to be done by one familiar with educational needs, and that without interference. The work was left to President Orton, whose studies of agricultural conditions, carried on so assiduously for many years, supplemented by his work as teacher, professor, and college president, had rendered him familiar with the complex problems involved. The curriculum was planned, not with a view to bringing the greatest number of students at the earliest moment, but with a view to the advantage of the state and of higher education. The wisdom of this course was soon manifest, for, though the number of students was small during the first year, it increased so rapidly, and the scope of the institution was expanded so greatly that in 1878 the name was changed to the Ohio State

University, the older title being recognized as no longer applicable.

But executive duties were never attractive to him; they interfered with his work as a student. Again and again he asked to be relieved from the presidency, but not until 1881 did the trustees feel that the institution could bear a change. At that time, when the university was established and its policy determined, they yielded to his urgent request. Thenceforward he devoted himself to the chair of geology. With characteristic wisdom he became merely a professor, and apparently forgot that he had been president. One finds no room for surprise at the respect and affection with which his colleagues regarded him.

Professor Orton's love for natural science was distinct early in life, but it always leaned toward application to the benefit of somebody, for, in the proper sense of the term, he was a utilitarian. As soon as he was settled at Yellow Springs he began to study the deposits so well exposed in that neighborhood and quickly gained, as no others had done, a thorough understanding of their relations. His collections of fossils, made wisely and scientifically, proved of great service to paleontologists; he delivered lectures upon scientific subjects, accurate, yet devoid of technical language—lectures of a type little known at that time; he was sought as a speaker among farmers, in village lyceums, and at teachers' institutes. Within two or three years he had become the scientific authority for southwestern Ohio. When the geological survey was organized in 1869 he was appointed one of the two assistants, with the southwestern portion of the state as his district.

At that time there were few geologists. The old surveys had ended in the early forties; a few attempts had been made to organize new surveys, but only that in Illinois had attained real success. Some students had gained experience on the government expeditions in the far West, but of trained geologists there were barely a score. Professor Orton belonged to the generation beginning work immediately after the Civil War, but

he had done much more than most of those within reach, so that his assistance was sought eagerly by Professor Newberry on the Ohio survey. He began the investigation of the Silurians and Devonian, which covered most of his district; but some of the higher deposits were reached and he was compelled, under instructions from the director of the survey, to pass beyond the limits of his district and take up discussion of problems which others thought were peculiarly their own. In all respects he was the strong man of the corps. Painsstaking and exact in observation; scrupulous in statement; cautious in speculation, he was called upon many times to render decisions in localities respecting which the reports were in conflict. When Dr. Newberry resigned after the publication of Volume III, Professor Orton was placed in charge. The work was in a peculiar condition. At the beginning of the survey the aids were mostly young men with little field experience, this of necessity, as trained geologists could not be obtained. Some of the work done by those observers was very defective, as the writer, one of the inexperienced aids, can testify; county reports, written independently, were not always accordant; even the general section was unsatisfactory, for identifications had been made with horizons in Pennsylvania beyond an area which had not been studied in detail. Prior to Professor Orton's appointment as director, the work along the state line had been completed for the Pennsylvania survey, and the results did not agree with those presented in the Ohio reports. All this can be said without in any wise reflecting upon those connected with the Ohio survey at the beginning, for every man labored conscientiously to the best of his ability, according to the knowledge then available. Their work, though erroneous in some of the details, resulted in great advantage to the state and in important contributions to geology.

But Professor Orton, in taking up the matter anew, saw that these errors, though apparently of slight economic importance, might lead eventually to serious results, and he set himself to correct them. How difficult the task was few can understand,

but the outcome was that masterly presentation of the whole Carboniferous series of Ohio, in which the relations and variations of every prominent bed as it occurs within the state and in adjacent portions of other states are presented in such fashion as to make the discussion distinctively one of the best yet contributed to Appalachian geology. In this the awkward task of correcting the errors of those who had made the original observations is performed with a delicacy rarely equaled. Good work is noted, but errors are referred to in such a way that to discover whose they are would require more labor than anyone would choose to expend. Indeed, the reader is inclined to believe that every error in observation was due to too earnest desire to do faithful work—which is more than half true.

During Professor Orton's term, the petroleum interests attained great importance; the origin of the oil, the mode of occurrence and the laws regulating the flow were studied with great care. At the same time and with equal care problems relating to natural gas were investigated. Professor Orton was recognized quickly as an authority upon all matters respecting petroleum and natural gas, whether scientific or technical, and he was called upon by the Kentucky, New York, and United States surveys to prepare elaborate reports; so that his writings will be the standard reference for years to come. His studies led him to issue appeals to the people of Ohio urging care in husbanding their resources; but these were not received in the spirit in which they were offered. He had the melancholy satisfaction of seeing his forebodings justified by the event. The distribution of fire and pottery clays, studied in reconnaissance by some aids on the Newberry survey, was taken up systematically and a complete investigation made under his direction by his son, who has succeeded him as director of the survey. Building stone, iron ore, glass sands, and other materials of economic interest, all received careful study. Professor Orton's reports prove the intimate relation between pure science and industrial growth.

Throughout his career, while ever anxious to improve the condition of the community by inducing men to utilize the discoveries of geology, he was ever on the alert to advance the

cause of pure science; for he always maintained that only by its rapid advance can the economic side find advance. The debt of geology to Edward Orton is very great, far greater than we are apt to think, for, in his writings, he effaced himself and often gave credit to others for what was rightfully his own. While he did much for science, he did even more for his state, many of whose industries owe the present success very largely to his efforts—efforts due solely to his anxiety for the public welfare and made without expectation of reward, pecuniary or otherwise.

But Professor Orton was more than teacher and geologist. With burdens of exacting character in the university and in the state geologist's office, he found time and opportunity for services in other directions. The city of Columbus lay near to his heart and he was indefatigable in efforts to advance its interests. He was always ready to aid in any organization looking to the public good; even the state's prisoners were objects of his care for many years. He did not neglect his duties as a citizen, but labored to secure proper candidates for political offices. His time belonged to others; he never felt himself his own.

Professor Orton was always impressed with the exceeding value of time, with the importance of utilizing moments. He was as one intrusted with an estate to be improved to the last degree before the owner's return. Every day's work was done as though that were the only day. Such conscientious devotion gave authority to his statements. Whenever his conclusions proved to be erroneous, the error was regarded as merely additional proof of the limitations of the human mind. With this spirit, whatever he did, whatever he wrote, was brought modestly as a contribution to the growing edifice of knowledge and was offered with such self-forgetfulness that recognition of its merit and of indebtedness to him appeared often to be a matter of surprise rather than of gratification. Honors came to him unexpectedly but they came often.

But while thus sensible of responsibility, Professor Orton never carried a burden. He enjoyed the companionship of his fellows; he had a keen sense of the humorous, but his humor never took the form of sarcasm; no sting was attached to any word

that cropped from his lips or pen. Many times he was compelled to assert himself forcibly, even indignantly, but no bitterness could be discovered in his rebukes. He was the incarnation of integrity; a friend who never wavered.

Little wonder that when he died, the loss to science was less regarded than was the personal loss which was felt by so many in all stations and in all callings; that the man was remembered more than a student. Those of us whose acquaintance with him began thirty years ago became attached to him in such fashion that we rejoiced when good came to him, not asking why it came but gratified that it had come to so true a man. The man has gone and now we think often of the student who deserved to the full, and more, all of the recognition which his work received. We can lay a double tribute upon his grave, one to the man whom we loved and one to the geologist who solved so many perplexing problems.

In the midst of his usefulness, in 1890, Professor Orton was stricken by paralysis which rendered his left side useless. Crippled, with his work incomplete, it seemed as though his life was to pass away in darkness. But his mental powers were unaffected and he recovered strength to such a degree that he continued to work until within a short time previous to his death. In 1899 his health gradually declined. When the American Association for the Advancement of Science met in Columbus last year, he gave an address, so much longer and so much more important than that expected from an incoming president, as to lead some to suppose that he did not expect to live until the meeting of this year. Be that as it may, the address was his last word to his fellow-workers in science. He grew perceptibly weaker after the meeting closed and, on October 16, 1899, he passed away suddenly and without pain.

Professor Orton married, in 1855, Mary M. Jennings, of Franklin, N. Y., who died in 1873. The four children of this union still survive. He married Anna Torrey, of Milbury, Mass., in 1875, who, with their two children, survives him.

JOHN J. STEVENSON.